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OBSERVATION OF STUDENT TEACHERS' PROBLEM IDENTIFICATION AND DEFINITION PROCESS DURING ONLINE TRAINING IN SCAFFOLDED PROBLEM BASED LEARNING STRATEGY (PBLS)

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Abstract :

It is the need of today's society that people are able to solve complex problems efficiently. Being able to successfully solve problems is more than just accumulating knowledge- it involves development of flexible, cognitive strategies that help analyse different problem situations to produce meaningful learning outcomes. Online training package on Scaffolded Problem Based Learning Strategy using the learning management system, MOODLE is intended to guide student teachers to become experts in the field of study, capable of identifying the problems based on the domain knowledge of the discipline and analyzing and contributing to the solutions in a completely online mode.

The online training package, designed on the lines of ADDIE model is assigned four credits and student teachers need to put in 120 hours of study for completion of the training. The package incorporates PBLS, follows collaborative approach and has provision of scaffolds. The study was conducted on 41 student teachers of Hansraj Jivandas College of Education. The student teachers were selected on the basis of their competence in the use of computer and internet. The student teachers undertook the online training in Scaffolded Problem Based Learning strategy (PBLS) wherein the student teachers had to solve ten problems related to difficulties faced by school teachers and administrators in the implementation of various aspects of PBLS. For every problem the researcher conducted a problem discussion, identification and definition in a synchronous mode and observed the student teachers during the process.

The researcher observed the student teachers during the process of problem discussion and identification and defining of the problem, in a synchronous mode. Observations indicate that the student teachers took less time as they proceeded from problem one to problem ten with respect to problem discussion, identification and problem definition. Also ambiguity with respect to the process of problem discussion reduced and student teachers gained confidence about the problem discussion, identification and definition process.

Keywords: *Online, Learning Management System, MOODLE, teacher training, Problem based learning, Scaffolds, problem discussion, problem identification, problem definition*

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Introduction :

People typically face a web of simple and complex decisions, daily hassles, and stressful and even traumatic life events. How people respond to difficult life problems is an exceedingly complex process (Heppner & Krauskopf, 1987) and seems to depend on many personal and environmental factors (Zeidner & Endler, 1996). Some people bring many skills and strengths to how they approach problems, whereas others have significant problem-solving deficits.

The accumulated evidence from the problem-solving appraisal literature indicates that perceived effective (as opposed to ineffective) problem solvers have better psychological and physical health, better coping effectiveness and better vocational adjustment. Perceived ineffective (as opposed to effective) problem solvers reported having (a) fewer social skills and (b) more social uneasiness/distrust/distress (Heppner & Peterson, 1982). It is the need of today's society that people are able to solve complex problems efficiently. This demands for the need of competence in problem-solving , thus leading to a necessity for problem-solving skills to be taught in schools and colleges so that the future generation can lead happy and fulfilling lives.

Problem Based Learning Strategy (PBLS), based on the premise of constructivist epistemology, represents a major development in higher education practice that continues to have a large impact across subjects and disciplines around the world and engages the learners in the problem-solving process. Problem Based Learning Strategy (PBLS) is an instructional strategy that initiates students' learning by creating the need to solve authentic problems collaboratively.

In the Indian context the use of Problem Based Learning Strategy (PBLS) is attempted in the disciplines of Medicine, Nursing, Pharmacy and very rare studies conducted in the field of Engineering, Teacher Education and School Education.

Outcomes of the effects of Problem Based Learning Strategy (PBLS) compared with those of traditional approaches on aspects of problem-solving such as planning and problem comprehension, generation of accurate and coherent problem solutions, construction of integrative explanatory essays for the concepts favoured students involved in Problem Based Learning Strategy (PBLS).

Pedersen and Liu (2002) explored the effectiveness of innovative hypermedia product for sixth graders in space science 'Alien Rescue', which used the Problem Based Learning Strategy. Result indicated that all students involved in learning using the Problem Based Learning Strategy showed enhanced problem-solving performance. Meta-analysis studies conducted by Dochy, Segers, Van den Bossche and Gijbels (2003) on effects of Problem Based Learning Strategy (PBLS) have shown positive effects of Problem Based Learning Strategy (PBLS) on aspects of problem-solving such as planning, problem comprehension, generation of accurate and coherent problem solutions.

Capon and Kuhn (2004) examined adult students' learning of Science using Problem Based Learning Strategy (PBLS). Results pointed to students exposed to Problem Based learning Strategy (PBLS) exhibiting superior skills leading to problem-solving .

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Cassarino (2006) conducted a study to investigate the impact of Problem Based Learning Strategy (PBLS) on critical thinking and problem-solving skills. The results of the qualitative data analysis indicated that the participants had difficulty in solving problems while forming group working patterns and those participants preferred a known strategy to solve problems as a group. The quantitative data showed a decline in critical thinking and problem-solving test scores following the use of Problem Based Learning Strategy (PBLS).

Metas and Constantinou (2007) conducted a study on use of technology fair, a problem based learning approach for primary school teachers to assess its effect on technological problem-solving skills. Results indicated that the technology fair contributed significantly for improving teachers' understanding and application of problem-solving strategies within the domain of technology.

Ding et al. (2014) conducted a pooled analysis based on fifteen studies to obtain an overall estimate of the effectiveness of PBLS on learning outcomes of preventive medicine in China. Results indicated that overall PBLS was associated with a significant increase in students' achievement test scores. The pooled PBLS effects were also significant among learning attitude, problem-solving and collaborative skills.

Balkevicius (2015) implemented action research applying PBLS in process of pre-service teacher education to study qualitatively the expression of students' cognitive and metacognitive abilities when solving pedagogical problems. Results revealed that pre-service teachers found PBLS to be an innovative educational strategy that makes education more self-directed, contextual, constructive and collaborative due to active use of problem-solving , cognitive and metacognitive abilities in learning process.

Kristina (2015) conducted a study on the curriculum supplemented with PBLS for grade fifth students. Results showed that students who engage with authentic problems and work towards real life solutions exhibited more critical thinking and problem-solving skills.

Aida, Holgaard and Egellund (2016) conducted a study to examine the effect of PBLS on the problem-solving skills in Engineering education. Results indicated that the PBLS model enhanced problem-solving process of Engineering graduates.

Thus studies conducted in various disciplines, except one study conducted by Cassarino (2006) have confirmed that Problem Based Learning Strategy develops problem-solving ability of the learners.

Training teachers in effective use of PBLS to improve the capacity and motivation of teachers to develop and integrate such problem-solving skills into their classroom practice should be the focus in today's context. Technology comes as an effective aid for providing training for professional development to in-service and pre-service teachers. Online Training in Scaffolded Problem Based Learning Strategy (PBLS) is intended to guide student teachers to become experts in the field of study, capable of identifying the problems based on the domain knowledge of the discipline and analyzing and contributing to the solutions. Online Training Package is the strategy of instruction used so as to produce learning experiences that lead to pre-specified learning goals and delivered through the medium of learning management system, MOODLE. In the first step of Scaffolded PBLS, the student teachers engaged in discussion in a synchronous mode for the purpose of problem discussion, identification and definition. The problem

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discussion was facilitated by the researcher and the time taken was noted and student teachers were observed by the researcher.

Objective of the study :

To observe the student teachers' problem identification and definition process during Online Training in Scaffolded Problem Based Learning Strategy (PBLS)

Method and Instrumentation :

The study was conducted on 41 student teachers of a College of Education. The student teachers were selected on the basis of their competence in the use of computer and internet. None of the student teachers were exposed to online training earlier and most of them were not aware of Problem based learning as well the scaffolding. The student teachers undertook the online training in Scaffolded Problem Based Learning strategy (PBLS) wherein the student teachers had to solve ten problems related to difficulties faced by school teachers and administrators in the implementation of various aspects of PBLS.

The Online training package on Scaffolded Problem Based Learning Strategy (PBLS) used the technique of Scaffolded Problem Based Learning Strategy (PBLS) to sensitize the student teachers to the Problem Based Learning Strategy (PBLS).

The Online training package is assigned four credits and student teachers need to put in 120 hours of study for completion of the training. Since Problem Based Learning is a novel and complex task for the student teachers who are novices in area of constructivism, they need to be provided with scaffolds for Problem Based Learning Strategy (PBLS). The scaffolds provided help in reducing the cognitive load of learners as they encounter the problems to be resolved leading to effective learning. Also the various online resources available for interaction and collaborative work act as scaffolds which is possible only in an online mode.

The salient features of the Online Training Package on Scaffolded PBLS are as follows:

- It is designed on the lines of ADDIE model,
- It incorporates Problem Based Learning Strategy
- It is based on constructivist approach,
- It has provision of variety of Scaffolds,
- It is available 24*7,
- It makes good use of Activity features of MOODLE and
- It has provision for collaborative learning.

For every problem, the researcher met the student teachers in a synchronous mode, gave instructions about problem discussion, presented the problem which was in the form of a video and then initiated the problem discussion by asking questions based on the problem presented. The student teachers were then asked to identify the problem in form of a problem statement.

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The researcher observed the student teachers during their engagement with the online training package eon Scaffolded Problem based learnings strategy comprising of ten problems. The researcher observed the student teachers with respect to the time taken for problem discussion and arriving at problem statement after the problem discussion. The researcher also observed the student teachers with respect to clarity of their roles, features of learning management system, MOODLS used for the purpose of training, arriving at problem statement, refining of problem statement, difficulties faced with respect to the content of Scaffolded Problem based learning strategy.

Table 1 gives the researcher's observations of the student teachers during their engagement with the online training package comprising of ten problems

Discussion of Problem	Level of Difficulty	Time taken	Researchers Observations
Module 1- Problem 1	Average	40 minutes and 5 seconds	The student teachers were not clear about their roles such as how should they answer, were they audible, accessibility of different modes such as audio, video, whiteboard, chat facility and who should take the initiative to answer, how to frame questions based on the problem. Also it took time to refine the problem identified but they did arrive at the appropriate, properly worded problem identified.
Module 1- Problem 2	Average	25 minutes and 57 seconds	It was easy to discuss the problem two as student teachers knew how to access and how to proceed with the discussion and use the various modes available.
Module 2- Problem 1	Average	19 minute and 6 seconds	Student teachers were somewhat familiar with what they were expected to do and how to frame the problem identified.
Module 2- Problem 2	Average	12 minutes and 10 seconds	Student teachers were very clear as to what they are expected to do in the problem discussion and the framing of problem identified did not take much time.
Module 2- Problem 3	Difficult	15 minutes and 32 seconds	The time taken for problem discussion was much more as compared to previous problems as there were many new terms with respect to assessment in this problem which had to be clarified

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Module 3- Problem 1	Difficult	13 minutes and 49 seconds	The time taken for problem discussion was more as compared to previous problems as there were many new terms with respect to models of PBLS in this problem which had to be clarified
Module 3- Problem 2	Average	9 minutes and 32 seconds	Problem discussion and the framing of problem statement went off smoothly.
Module 4- Problem 1	Average	6 minutes and 47 seconds	The students arrived at the properly worded Problem statement in the first attempt itself and student teachers were very comfortable with the problem discussion.
Module 4- Problem 2	Difficult	12 minutes and 2 seconds	The discussion took longer duration as the student teachers struggled to arrive at clarity on Project Based Learning and PBLS.
Module 4- Problem 3	Average	NIL	Discussion could not be carried out due to internet issues. Student teachers framed the problem identified in their respective groups

Analysis and Discussions :

Through the analysis of the researcher's observations of the student teachers during their engagement with the online training package on Scaffolded Problem Based learning strategy comprising of ten problems, the following aspects can be generalized

1. As the student teachers proceeded from problem one to problem ten, the time taken for discussion of the problem and arriving at problem statement took less time. The time taken for problem one discussion was forty minutes and five seconds whereas the time taken for problem nine discussion was twelve minutes and nine seconds. The reasons for less time needed for the subsequent problem discussion could be due to the confidence gained by the student teachers due to the familiarity with problem solving process.
2. The student teachers, though faced difficulty in understanding the purpose of problem discussion as they were novices to the process, finally could arrive at the problem statement (definition of the problem).
3. As the student teachers moved from problem one to problem two, they were much comfortable during the problem discussion stage, as compared to problem one, as they had become familiar with the problem discussion stage and understood its importance in the problem- solving process and for arriving at solution to the problem.
4. Depending on the complexity and novelty of the content of the problem, the student teachers took varying time to complete problem discussion to arrive at problem statement though they were comfortable with the problem discussion.

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5. During the last problem the discussion in synchronous mode could not be carried out but students managed to identify and arrive at the problem statement through asynchronous mode discussion.

Conclusion :

The student teachers being digital learners but novices with respect to Scaffolded problem based learning, though faced difficulty in the initial stage of a complex process of Problem based learning, became comfortable when faced with a new problem. The time taken to complete the first stage of the complex Scaffolded Problem based learning strategy reduced as student teachers proceeded from problem one to problem ten. This indicates that web based innovative strategies, which focus on skill development of students need to be introduced for making the students self-directed learners and develop confidence in themselves as independent learners.

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